REMARKS

REJECTION UNDER 35 USC 103:

Claims 1 through 7 and 12 stand allegedly rejected under 35 USC 103 over Raggio in view of Surles or vice versa. In advancing the instant rejection the Examiner maintains that "Raggio shows a gas lift valve V that injects gas through orifices 14e into nose 15, then into the interior of the tubing T through an injection orifice 22 which points upwards. While illustrated as mounted to an external mandrel, the valve can be mounted in a side pocket (col. 5, lines 19-23)." Applicant respectfully traverses the Examiner's rejection.

Raggio does not appear to contain a single textual reference to the direction of gas injection into the tubing "T". In applicant's view the absence of such a reference is clear, namely that Raggio was not concerned about the flow direction of the fluid being injected into the tubing.

One of the principal objectives of applicant's invention is the optimization of gas introduction into the flow of production fluid through the production tubing. In this respect the Examiner is respectfully directed to paragraphs [0030], [0044], and [0057] of applicant's specification. The specific direction of the fluid flow being injected into the production fluid flow is critical in achieving applicant's objective. As discussed in applicant's specification, conventional mandrels adapted for use in side pockets are configured to inject a gas flow either horizontally or downwardly into the fluid flowing through the production tubing. Applicant's Claim 1, in contrast, requires at least one injection orifice configured for injecting gas upwards into the interior of the body of the mandrel for a gas lift valve. More specifically, Applicant's Claim 1 is directed to an arrangement wherein the injected gas is directioned along a flow path whereby upon its exit from an injection orifice the gas is traveling in an upward direction. By mandating this particular flow direction the momentum of the injected gas flow contributes to the momentum of the upward flow of the production fluid through the tubing.

Applicant's approach stands in contrast to that of the conventional approach which teaches the art to introduce the injection fluid into the production tubing in a direction which

diminishes the momentum of the reservoir fluid flow. The criticality of this particular feature of applicant's invention is set out in applicant's specification at paragraphs [0026] through [0030]. Further explanation is set forth in paragraphs [00119]-[00125] wherein applicant also discusses the use of the injection orifice(s) to obtain the benefits of the "Coanda effect". This effect is specifically referenced in paragraphs [0038] through [0044] of applicant's specification. This effect is described in more detail in Coanda et al (US 3,784,325). It follows that applicant has clearly set out in his specification, the need for introducing fluid into the production tubing in an upward direction and the criticality of adopting that particular direction for introducing the fluid.

In applicant's view, until the filing of applicant's application, the art had not recognized the need nor the implications associated with introducing the injection fluid into the production tube in an upward direction. More particularly, the art had not recognized that by adopting applicant's upward direction for introducing the injection fluid, the injected fluid would actually contribute to the momentum of the production fluid flowing in the production tube. In support of applicant's position, the teachings of McMurry and Abercrombie (US 4,110,057) is illustrative. The McMurry and Abercrombie (hereinafter "McMurray") application was filed almost at the same time of that of Raggio. This application was directed to a conventional (external) gas lift mandrel. As one can note from Fig. 5 of the McMurray patent, which represents one of the possible embodiments of the McMurray invention, and its description (column 11, last paragraph), the injection is performed through passage 144 into production stream at 146 in a horizontal direction. This shows that at the time of Raggio the direction of gas injection was not considered important. If it were considered relevant, certainly McMurry and Abercrombie would had presented this feature in their invention.

In column 5, lines 19-23, Raggio cites that the valve can be used in a side pocket mandrel "in the known manner". One skilled in the art of gas lifts would clearly understand from this statement that the valve of Raggio may be mounted in an ordinary side pocket mandrel like the one presented in Lamb (RE 25,760). Lamb was previously cited by the examiner in the immediately previous Office Action. There appears to be no reason that would lead a skilled person to use the valve of Raggio in a side pocket mandrel with upward gas injection. Raggio

does not make even a single textual comment about the need for an upward gas injection. Instead, Raggio simply teaches the use of his invention in a side pocket mandrel "**in the known manner.**"

In applicant's view, Raggio's use of the terminology "in the known manner" must be interpreted in the context of the art at the time of the filing of the Raggio application. As will be shown by the following review of the art at the time of the Raggio filing, "in the known manner" should be construed as meaning the injection of the fluid downwardly into the production tubing.

Decker (US 5,066,198) reviews the state of the art regarding gas lift valves and mandrels used in the beginning of the 90's. In fact, the mandrels presented therein are still used today with only slight modifications. Figure 2 of Decker presents a state-of-the-art side pocket mandrel. Here again, the gas injection is downward. Figure 8 presents a state-of-the-art conventional (external) mandrel. The gas injection is horizontal. Decker makes no reference to the importance of the gas injection direction. The reason for that is clear, the art had not recognized the importance of the direction of fluid injection. In fact, this recognition did not occur until applicant's instant invention.

Assuming *arguendo* the correctness of the examiner's argument, that is, that Raggio shows that upward injection is more efficient and that such an injection direction is obvious, one could expect that subsequent publications would have acknowledged this key point. The text of the Decker patent appears to disprove this position. In applicant's view, Raggio did not recognize the need for orienting the injection flow in an upward direction, nor did Raggio recognize the benefits that would be achieved by adopting such an orientation..

With respect to the Examiner's position that the teachings of Raggio can be combined with those of Surles, the examiner has maintained that "Surles shows such a mounting arrangement, ... It would have been obvious to place Raggio valve in a side pocket mandrel as shown by Surles, with a seal at the lower body because Raggio teaches the equivalence of such

an arrangement." Applicant respectfully disagrees.

The combination of Raggio with Surles is not warranted. Surles describes a two-way gas lift valve, that is, a gas lift valve which allows flow from the tubing to the annulus and vice versa. Raggio shows a one-way gas lift valve. The valve of Raggio would not properly function in the Surles mandrel. It is established law that if a proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teaching of the references are not sufficient to render the claims *prima facie* obvious. See *In re Ratti,* 270 F. 2d. 810, 123 USPQ 349 (CCPA 1959). In the instant context, applicant respectfully submits that the combination proposed by the Examiner would impermissibly change the principle of operation of the either the Raggio or the Surles apparatus and therefore the combination is unwarranted. Furthermore, there would be no justification nor motivation for a skilled person to suggest such a combination. Even considering this combination there is no reasoning that would lead a skilled person to modify the Surles mandrel in order to facilitate a one way injection in an upward direction. As indicated previously Raggio does not provide any textual suggestion that the gas injection direction is of any importance.

In view of these considerations, applicant respectfully submits that the combination of Raggio and Surles does not meet the requirements of 35 USC 103 and therefore the rejection based on thereon should be withdrawn.

PATENTABILITY OF NEWLY ADDED CLAIMS:

By this amendment, applicant has introduced seven new claims, namely claims 13-19. These new claims are directed to a gas valve mandrel which provides for the mounting of a gas valve within the tubing itself. In this construction, fluid injected by the valve is injected directly into the body of the flow stream within the tubing as opposed to being injected into the boundary of the flow stream proximate the sidewall of the tubing which is the case in structures such as Raggio. The new claims further provide for a valve receptacle structure which defines a receptacle for retaining a gas lift valve. The receptacle is positioned elevationally above a

chamber defined within the lower body of the structure. The chamber communicates with the receptacle whereby fluid discharged from a gas valve retained in the receptacle may pass into the chamber. The lower body further defines an upwardly inclined passageway which communicates the chamber with the tubing fluid path

Claim 14 includes the further limitation of the orifice being positioned within the flow path within the tubing and spacedly from the sidewall which defines the interior of the tubing.

Claim 15 includes the additional limitation of the orifice being disposed elevationally below the gas valve receptacle.

Claim 16 includes the further limitation of a plurality of additional upwardly inclined passageways being defined within the lower body.

Claim 17 includes the additional limitation that the plurality of additional upwardly inclined passageways each include a respective orifice and each of these orifices is disposed elevationally below the valve receptacle.

Claim 19 includes the limitation of a gas valve being positioned with the receptacle. This gas valve is constructed to provide a first injection opening proximate the upper end of the valve and a second injection opening proximate the lower end of the valve. The first injection opening is configured to facilitate an injection of fluid into the flow path of the tubing in a direction parallel to that flow path. The second injection opening communicates with the aforesaid chamber thereby permitting an injection of fluid through the upwardly inclined passageway and its associated orifice.

Applicant respectfully submits that the instant claims distinguish over the Raggio and Surles references, both individually and in combination.

Instead of being primarily directed to a mandrel, the Raggio reference is principally directed to a gas valve. Raggio contains only an indirect reference to a mandrel, namely mandrel (21). In fact, Raggio indicates that mandrel (21) is of conventional construction. (See col. 2, line 34.) In contrast to the Reggio mandrel, Applicant's claimed mandrel is specifically directed for mounting within the interior of the tubing, Raggio's mandrel, in contrast, is specifically adapted for mounting on the exterior of tubing (T). Raggio contains no teaching that the mandrel (21) can be used within the interior of the tubing. Although the specification of the Raggio reference indicates that the valve V may be used within the tubing interior, (See col. 5, lines 21-23.) Raggio further indicates that when the valve V is mounted inside of the tubing, it is mounted in the "known manner." There is no indication in Raggio that the mandrel (21) can or should be used for mounting the gas valve within the interior of a tubing. Indeed, mandrel (21) is undoubtedly a type of mandrel adapted solely for use in mounting gas valves on the exterior and not the interior of tubing.

Following the literal wording of the Raggio disclosure, if the Raggio gas valve is to be mounted within the interior of the tubing the workman of ordinary skill should utilize installation techniques and components which are conventionally used for mounting gas valves within the interiors of such tubing. Raggio contains no indication that a mandrel of the type illustrated as mandrel (21) is of this type. Instead, Raggio indicates that such an installation should be in the "known manner." The Examiner has provided no identification of such a known installation technique for use within the interior of a tubing which involves an upwardly inclined discharge passageway.

It is respectfully submitted that the Examiner has not discovered any disclosure of an "known manner" for installing a gas valve within the interior of a tubing wherein a gas valve is shown installed with a chamber positioned below the gas valve and wherein that chamber communicates with the interior flow path of the tubing through an upwardly inclined passageway.

Furthermore, applicant respectfully submits that the mandrel (21) of Raggio does not disclose nor suggest a structure which is suitable for mounting within the interior of the tubing in a manner which would be operative. As can be observed in Fig. 1 the discharge opening of the channel 21b is positioned on a surface of the mandrel which is adapted for mounting on the exterior wall of the tubing (T). Raggio contains no teaching nor suggestion as to the importance of having an upwardly oriented passageway in the mandrel. There is no demonstrated need in Raggio to adopt the mandrel construction (21) for use within the interior of the tubing. Instead of suggesting the use of the mandrel structure (21) in the interior of the tubing, Raggio teaches the art to utilize other conventional techniques which are already known for mounting gas valves within the interior of tubing.

It is clear from Raggio's disclosure that the surface of the mandrel (21) which defines the discharge opening for the channel (21b) is intended as a mounting surface. The use of the Raggio mandrel within the tubing interior would be precluded unless the mandrel were significantly modified structurally. Raggio contains no suggestion to remove the discharge opening from the mounting surface. Indeed, the presence of the discharge opening within the mounting surface is necessary in order to render the Raggio mandrel operative. Applicant respectfully submits that a modification of the mandrel (21) to remove the discharge opening from the mounting surface is neither taught nor suggested by the Raggio reference. Furthermore, any such modification would render the Raggio mandrel inoperative for its purpose as disclosed by Raggio.

The Surles reference discloses a gas valve (14) which is mounted within a side pocket (11). Surles discloses a plurality of discharge orifices (42) which as associated with horizontally oriented passageways through the thickness of the sidepocket wall (11). Surles does not appear to teach nor suggest the need or importance of inclining those passageways upwardly from the horizon. It follows that any combination of Raggio and Surles would neither teach nor suggest a madrel construction adapted for use within a tubing interior wherein a chamber is positioned elevationally below a receptacle for a gas valve and wherein the chamber communicates with the interior of the tubing through a passageway which is upwardly inclined to the horizon.

With reference to claim 14, the instant claim provides a structure wherein the discharge opening of fluid being injected into the flow stream within the tubings is within the flow stream itself. The importance of this particular situs for injecting the fluid from the gas valve is set out in applicant's specification at paragraphs [0025-0030] and [00111- 000112]. As indicated therein the instant method of injecting fluid addresses the issue of "fallback" and thereby reduces the likelihood of a part of the liquid forming the slug being deposited in the bottom of the tubing thereby improving the gas lift efficiency.

As further noted in applicant's specification at [000116 through 000119] the instant claimed orientation of the discharge opening permits injection of fluid in a central portion of the region of flow. This in turn results in an effective mixing of the injected gas with the fluids originating from the reservoir. In follows that applicant provides a structure which combines the benefits of providing an injection from the gas valve which is directioned along an upwardly inclined passageway, thereby providing the fluid with a momentum having a directional component parallel with that of the flow stream within the tubing. Further, the claimed structure provides a means of introducing this momentum enhanced fluid directly into the central portion of the fluid stream from the reservoir thereby enhancing the interaction , e.g. mixing, of the fluid from the gas valve with the fluid from the reservoir. As an end result, as stressed in applicant's specification, the problem of fallback is addressed while simultaneously providing other enhanced flow properties.

Raggio contains no teaching or suggestion of positioning the discharge opening of the gas valve (22) within the central portion of the flow stream within the tubing (T). Instead, Raggio positions the discharge opening (22) on the sidewall of the tubing on the boundary of the flow stream. It follows that Raggio does not teach nor disclose the limitation of claim 14 namely the placement of the discharge opening spacedly from the sidewall of the tubing.

Claim 15 requires that the discharge orifice be positioned elevationally below the gas valve in a gas valve mandrel adapted for use **within** tubing. As noted above, while Raggio

suggests the mountability of his gas valve V within a tubing, Raggio does not suggest nor disclose the mounting of the mandrel (21) within the tubing. Indeed, Raggio does not disclose the exact structure of a mandrel which would be suitable for mounting the gas valve within the tubing, other than indicating that conventional mounting structures should be used. The discharge orifices (42) of the Surles reference are not positioned elevationally below the gas valve. Indeed, as can be noted from Fig. 1B, the gas valve (14) extends almost to the bottom of the sidepocket (11) while the discharge orifices (42) are positioned significantly above the bottom of the valve (14). None of the mandrels identified in the Raggio or Surles references appears to provide a structure for mounting a gas valve within a tubing wherein the discharge orifice is positioned elevationally below the receptacle for mounting the gas valve. Furthermore, neither reference teaches nor suggests the advisability of positioning the discharge orifice at such a location.

Claim 16 is directed to a lower body which defines a plurality of upwardly inclined passageways which communicate with a chamber. Raggio does not disclose a plurality of such passageways. While Surles discloses a plurality of channels (42), these passageways are not shown as being inclined. Since the inclined channel (21b) of the Raggio mandrel from part of a mandrel adapted for mounting externally of the tubing as opposed to internally within the tubing, and furthermore since the Raggio mandrel does not appear to be mountable within the interior of the tubing, applicant respectfully submits that there is no suggestion to modify the Surles channels (42) to be upwardly inclined. It follows that there is no suggestion or teaching to modify the Surles channels to render them inclined upwardly from the horizon.

Claim 17 includes the further limitation that the each of the orifices associated with the plurality of inclined passageways is positioned elevationally below the gas valve receptacle. Surles teaches that the discharge orifices are not positioned below the gas valve. See Fig. 1B. The mandrel of Raggio, as indicated above, is not a mandrel suitable for mounting within the interior of a tubing and therefore its teachings are not directly applicable. It follows that any combination of the two references would neither teach nor suggest the positioning of a plurality of discharge orifices elevationally below the gas receptacle.

Claim 19 includes the further limitation of a gas valve positioned within the valve receptacle wherein the gas valve is adapted for discharging fluid though an opening on its upper end as well as on its lower end. Neither Raggio nor Surles discloses nor suggests such a gas valve. In face, It follows that any combination of the two references would likewise not suggest such a gas valve structure.

CONCLUSION:

Entry of the amendments, as set forth herein, prior to examination of the Request for Continued Examination on the merits is respectfully requested.

Respectfully submitted,

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